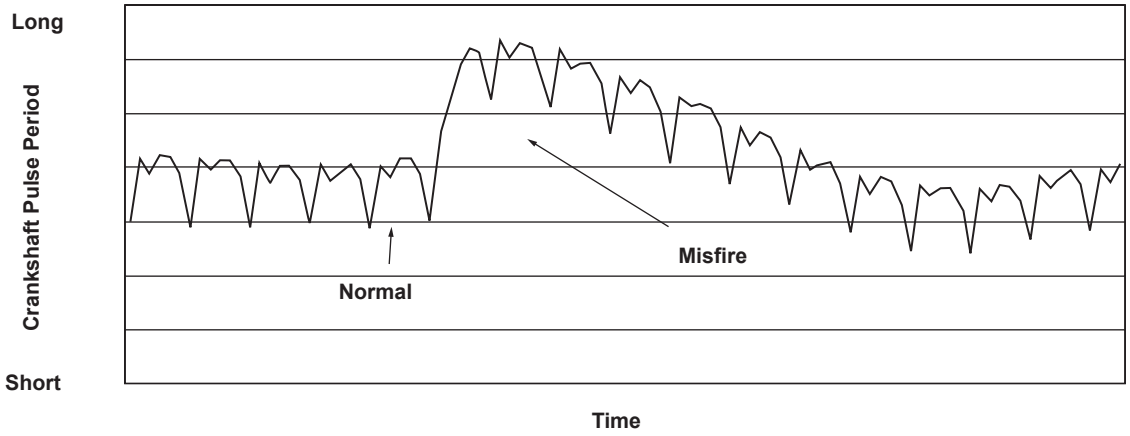
Advanced Diagnostics

DTC P0301: No. 1 Cylinder Misfire
DTC P0302: No. 2 Cylinder Misfire
DTC P0303: No. 3 Cylinder Misfire
DTC P0304: No. 4 Cylinder Misfire

Crankshaft Position (CKP) Sensor Pulse Data



P0301-9671

General Description

The crankshaft vibrates slightly when each cylinder fires. If a misfire occurs, the crankshaft rotation speed changes rapidly. The engine control module (ECM)/powertrain control module (PCM) monitors engine misfiring based on the output pulses from the crankshaft position (CKP) sensor, counts the number of misfires, and determines which cylinder is misfiring. If a misfire is detected, a DTC is stored.

There are two types of misfire detection.

Type 1 (1 drive cycle): When the number of misfires per 200 engine revolutions reaches the level that damages the three way catalyst (TWC), a DTC is stored and the MIL blinks. When the misfire ceases, the MIL remains on steady instead of blinking.

Type 2 (2 drive cycles): When the number of misfires per 1,000 engine revolutions reaches the level that affects exhaust emissions, a DTC is stored and the MIL illuminates.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	—
DTC Type	One or two drive cycles, MIL ON*

* : See diagnosis details.

Enable Conditions

Condition		Minimum	Maximum
Engine coolant temperature		15ºF (-9ºC)	—
Intake air temperature		15ºF (-9ºC)	—
Engine speed		500 rpm	6,300 rpm
MAP value	Vehicle speed = 0 700 rpm	22 kPa (164 mmHg, 6.5 in.Hg)*1, *3	—
		21 kPa (156 mmHg, 6.1 in.Hg)*2	
	Vehicle speed = 0 3,000 rpm	21 kPa (161 mmHg, 6.3 in.Hg)*1	—
		21 kPa (159 mmHg, 6.3 in.Hg)*2	
		23 kPa (172 mmHg, 6.8 in.Hg)*3	
	Vehicle speed > 0 700 rpm	28 kPa (207 mmHg, 8.1 in.Hg)*1	—
		25 kPa (188 mmHg, 7.4 in.Hg)*2	
		30 kPa (223 mmHg, 8.8 in.Hg)*3	
	Vehicle speed > 0 3,000 rpm	31 kPa (234 mmHg, 9.2 in.Hg)*3	—
	Vehicle speed > 0 4,300 rpm	31 kPa (236 mmHg, 9.3 in.Hg)*1, *2	—
No active DTCs		ECM/PCM, MAP, CKP, ECT, TP, TDC, CYP, IAT, BARO, VSS*2, *3	
Other		Test-drive on a flat road to avoid misdetection	

*1: F23A4 engine
*2: F23A1 engine
*3: F23A5 engine

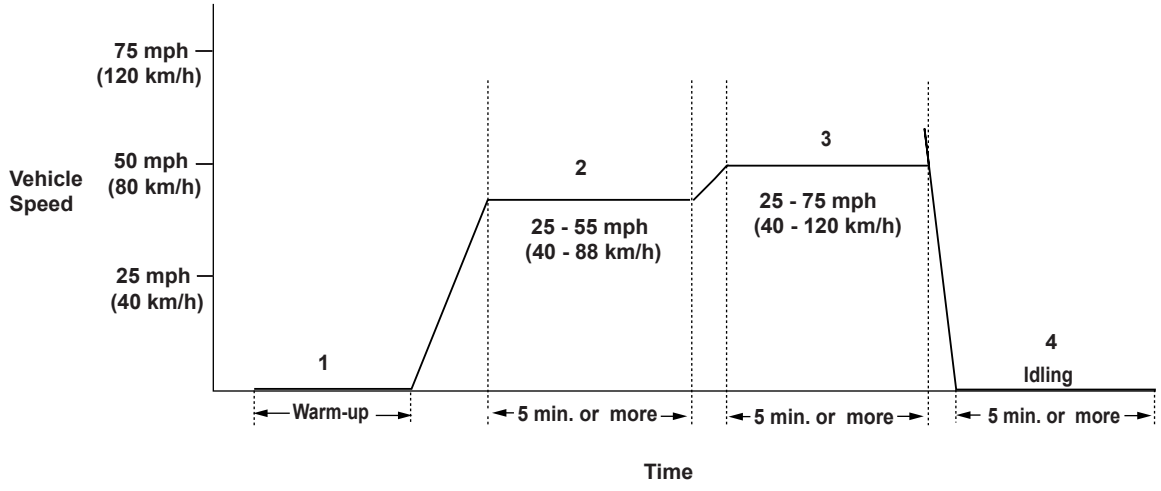
Malfunction Threshold

The number of misfires versus the number of engine revolutions is equal to or greater than the value in the table.

Misfire Type	The number of engine revolutions	The number of misfires
Misfire Type 1	Per 200 revolutions	32*1, 40*4 - 90 times**
Misfire Type 2	Per 1,000 revolutions	36*1, 50*4 times

** : Depending on engine speed and load.
*1: F23A4 engine
*4: F23A1, F23A5 engines

Driving Pattern



P0301-9650

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a speed between 25 - 55 mph (40 - 88 km/h) for at least 5 minutes.
3. Then, drive at a steady speed between 25 - 75 mph (40 - 120 km/h) for at least 5 minutes.
4. Stop the vehicle and let the engine idle for at least 5 minutes.

- When freeze frame data is stored, drive the vehicle under those conditions instead of Driving Pattern 3 or 4.
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

Diagnosis Details

Conditions for illuminating the MIL

Misfire Type 1: Under high rpm or high load conditions: The MIL blinks once per second if a type 1 misfire (catalyst damaging) occurs, and a Temporary DTC is stored. If the type 1 misfire ceases, the MIL goes off. If a type 1 misfire occurs during the next (second) drive cycle, the MIL blinks at the first misfire occurrence, and the DTC and the freeze frame data are stored. The MIL remains on steady if the type 1 misfire ceases.
Under normal driving conditions: The MIL blinks once per second if a type 1 misfire occurs the third time, and a Temporary DTC is stored. If a type 1 misfire occurs during the next (second) drive cycle, the MIL blinks during the third time of the type 1 misfire occurrence, and the DTC and the freeze frame data are stored. If the type 1 misfire ceases, the MIL remains on steady.

Misfire Type 2: When a type 2 misfire (emission-related but not severe enough to immediately damage the TWC) occurs within the first 1,000 crankshaft revolutions of engine start-up, a Temporary DTC is stored.
If a type 2 misfire occurs after the first 1,000 crankshaft revolutions of engine start-up, a Temporary DTC is stored during the fourth time of the type 2 misfire occurrence.
If a type 2 misfire occurs during the next (second) drive cycle under the same conditions as when the Temporary DTC was stored, the MIL comes on and the DTC and the freeze frame data are stored.

Conditions for clearing the MIL

The MIL will be cleared if the malfunction does not recur during three consecutive drive cycles in which the engine conditions are similar to the first time the malfunction was detected.
The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.